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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Yasuhiko OKI, et al.

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For: INK COMPOSITION, INK JET RECORDING METHOD AND RECORDED ARTICLE

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Commissioner for Patents

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DECLARATION UNDER 37 CFR 1.132I, Yasuhiko Oko, hereby declare as follows:

1. I am a co-inventor of the invention described and claimed in the above application. I make this declaration in support of the application.
2. The following experimentation was done by me or under my supervision and control and I have first hand knowledge of the results described below.

3. Additional test A

Ink compositions of examples 14-17, comparative examples 10 and 11, and example 1 were prepared in the mixing proportions shown in Table 5 according to the first preferable form of the present invention.

A printed article was prepared using each of the ink compositions described in examples 14-17, comparative examples 10 and 11, and example 1 according to the first preferable form of the present invention, and those printed articles are evaluated for ozone resistance, nitrogen oxide resistance, and clogging resistance. In this test, three exposure times, i.e., six hours, 12 hours, and 24 hours, were provided for ozone resistance evaluation, and two non-use periods (for which the printer was left unused), i.e., two weeks and one month, are provided for clogging resistance evaluation.

The obtained evaluation results are shown in Table 6.

4. Additional test B

Ink compositions of example 18 and example 9 were prepared in the mixing proportions shown in Table 7 according to the second preferable form of the present invention.

A printed article is prepared using each of the ink compositions described in example 18 and example 9 according to the second preferable form of the present invention, and those printed articles were evaluated for ozone resistance, nitrogen oxide resistance, and clogging resistance. In this test, two non-use periods (for which the printer was left unused), that is, two weeks and one month, are provided for clogging resistance evaluation. The obtained evaluation results are shown in Table 8.

The results of example 14 and comparative example 1, example 15 and comparative example 10, and example 18 and example 9 show that Na salt exhibits poor recoverability when the printer is left unused for longer periods, while Li salt maintains good recoverability even when the printer is left unused for longer periods. It is evident from the comparison with comparative example 11 that in comparative example 10, clogging resistance is lowered by the addition of an additive, and it can easily be judged from the results of example 15, comparative example 10, and comparative example 11 that Li salt is effective in improving ozone resistance while maintaining this good clogging resistance.

Table 6

Colorant Solvents etc.	C.I. Direct Blue 186(a)	Examples					Comparative Examples				
		14	15	16	17	18	Ex 1	Ex 2	Ex 3	Ex 4	Ex 5
	Chloroform	1	3	3	0.5	0.5	1	10	3	1	3
	Tetrahydrofuran	10	3	3	0.5	0.5	1	10	3	1	3
	2-pyrrolidone	10	3	3	0.5	0.5	1	10	3	1	3
	Triethylamine	1	3	3	0.5	0.5	1	10	3	1	3
	Diethylene glycol monobutyl ether	1	3	3	0.5	0.5	1	10	3	1	3
	Triethylene glycol monobutyl ether	1	3	3	0.5	0.5	1	10	3	1	3
	Other EtOAc	10	3	3	0.5	0.5	1	10	3	1	3
	Propylene glycol	1	3	3	0.5	0.5	1	10	3	1	3
	1,2,3-trichloroethanol	1	3	3	0.5	0.5	1	10	3	1	3
	Urea	1	3	3	0.5	0.5	1	10	3	1	3
	Diluted sodium methanolate-1,5-dichloroethane	1	3	3	0.5	0.5	1	10	3	1	3
	Diluted sodium methanolate-1,5-dichloroethane 10%	1	3	3	0.5	0.5	1	10	3	1	3
	Water solutions	30	20	20	5	1	3	2	2	2	2
	Fluorene in benzene	30	20	20	5	1	3	2	2	2	2
	Diluted benzene-1,3-dichloroethane 10% water solution	30	20	20	5	1	3	2	2	2	2
	Figure in parentheses indicates solid content	30	20	20	5	1	3	2	2	2	2
	Proxel XL-2 (45)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Water	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Other	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Ratio between colorant and aromatic sulfonic acid/sulfonate	1:3	1:3	1:3	1:3	1:3	1:3	1:3	1:3	1:3	1:3

*Colorant having absorption wavelength as shown in Fig. 1 used
 †Made by Nippon Chemical Industry Co., Ltd.
 ‡Made by Avesta Ltd.

Table 7

		Examples	
		18	Ex9
Colorant	Q1 Direct Blue 86(4)	1	1
Solvents etc.	Glycerol	6	5
	Tetralene glycol	5	5
	Tetralenamine	1	1
	Tetralene glycol monobutyl ether	10	10
	Oilfin PD001(95)	3	1
Additives	Dioctyl naphthalene-2,8-disulfonate		4
	Dilithium naphthalene-2,8-disulfonate 10%	40	
	Water solution	(4)	
	Fluore in paraffinates indicates self content	0.3	
Others	Phenol XI-2(46)		0.3
	Water	Remainder	
Ratio between colorant and aromatic sulfonic acid/sulfonate		14	14

*4:Colorant having absorption wavelengths as shown in FIG. 2 used
 *5:Made by Nihon Chemical Industry Co., Ltd.
 *6:Made by Aveda Ltd.

Table 5

		Ozone Resistance			NO ₂ Resistance		Clogging Resistance	
		6 Hours	12 Hours	24 Hours	6 Hours	12 Hours	2 Weeks	1 Month
Examples	14	A	A	B	A	A	A	B
	15	B	B	C	A	A	B	B
	16	A	B	B	A	A	A	B
	17	A	B	C	A	A	A	B
Comparative Examples	Ex1	A	A	B	A	A	A	D
	10	B	B	C	A	A	C	D
	11	B	D	D	A	A	B	B

Table 6

		Ozone Resistance		NO ₂ Resistance		Clogging Resistance	
		6 Hours	12 Hours	6 Hours	12 Hours	2 Weeks	1 Month
Examples	18	A	B	A	A	B	B
Comparative Examples	Ex9	A	B	A	A	B	D

5. I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application of any patent issued thereon.

Date: August 20, 2007

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